FIG. 1

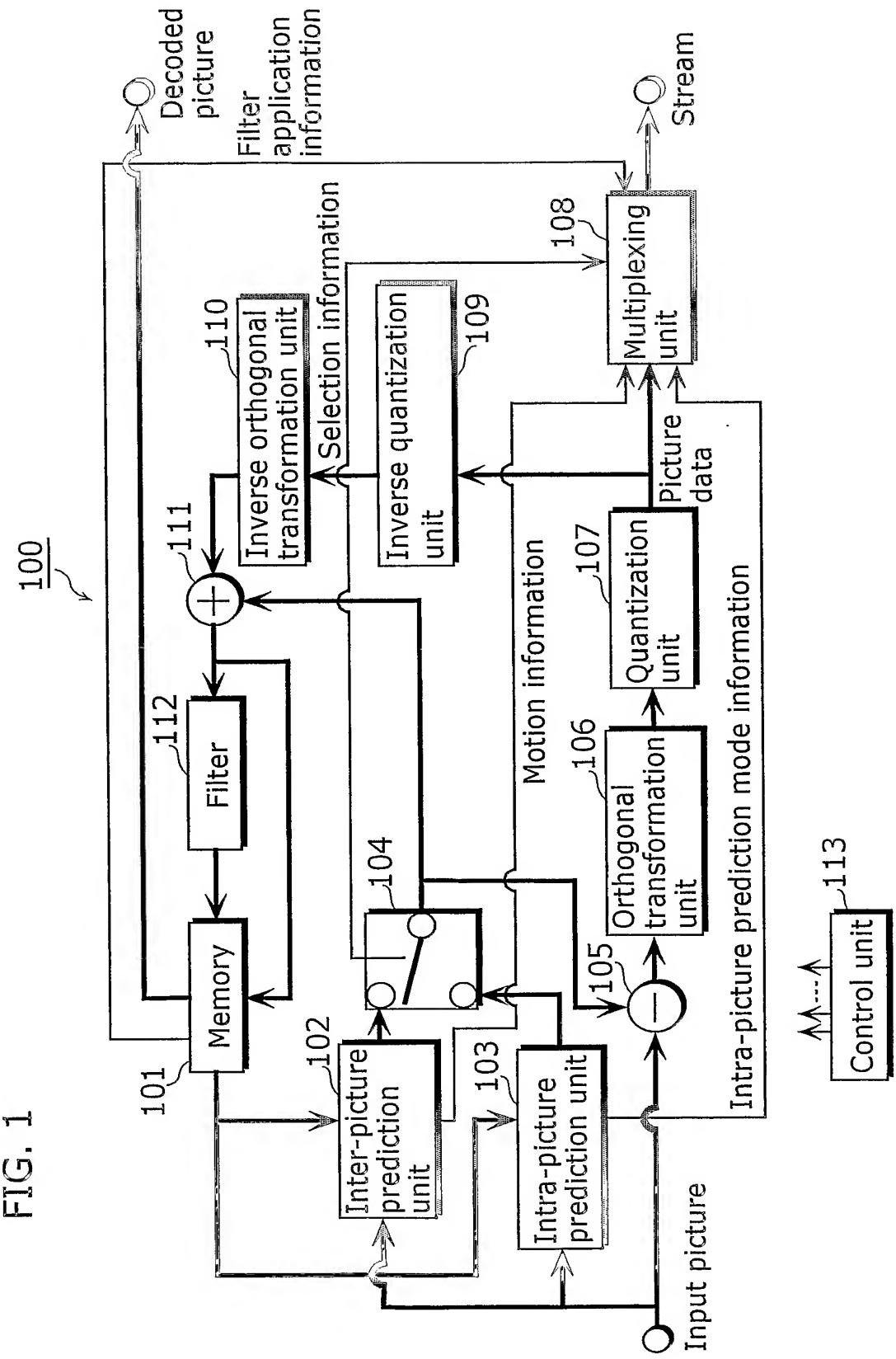

100
Decoded picture
Filter application information
Stream
Selection information
108
Multiplexing unit
110
Inverse orthogonal transformation unit
109
Inverse quantization unit
111
Picture data
Motion information
107
Quantization unit
112
Filter
106
Orthogonal transformation unit
104
Intra-picture prediction mode information
105
101
Memory
102
Inter-picture prediction unit
103
Intra-picture prediction unit
Input picture
113
Control unit

FIG. 2

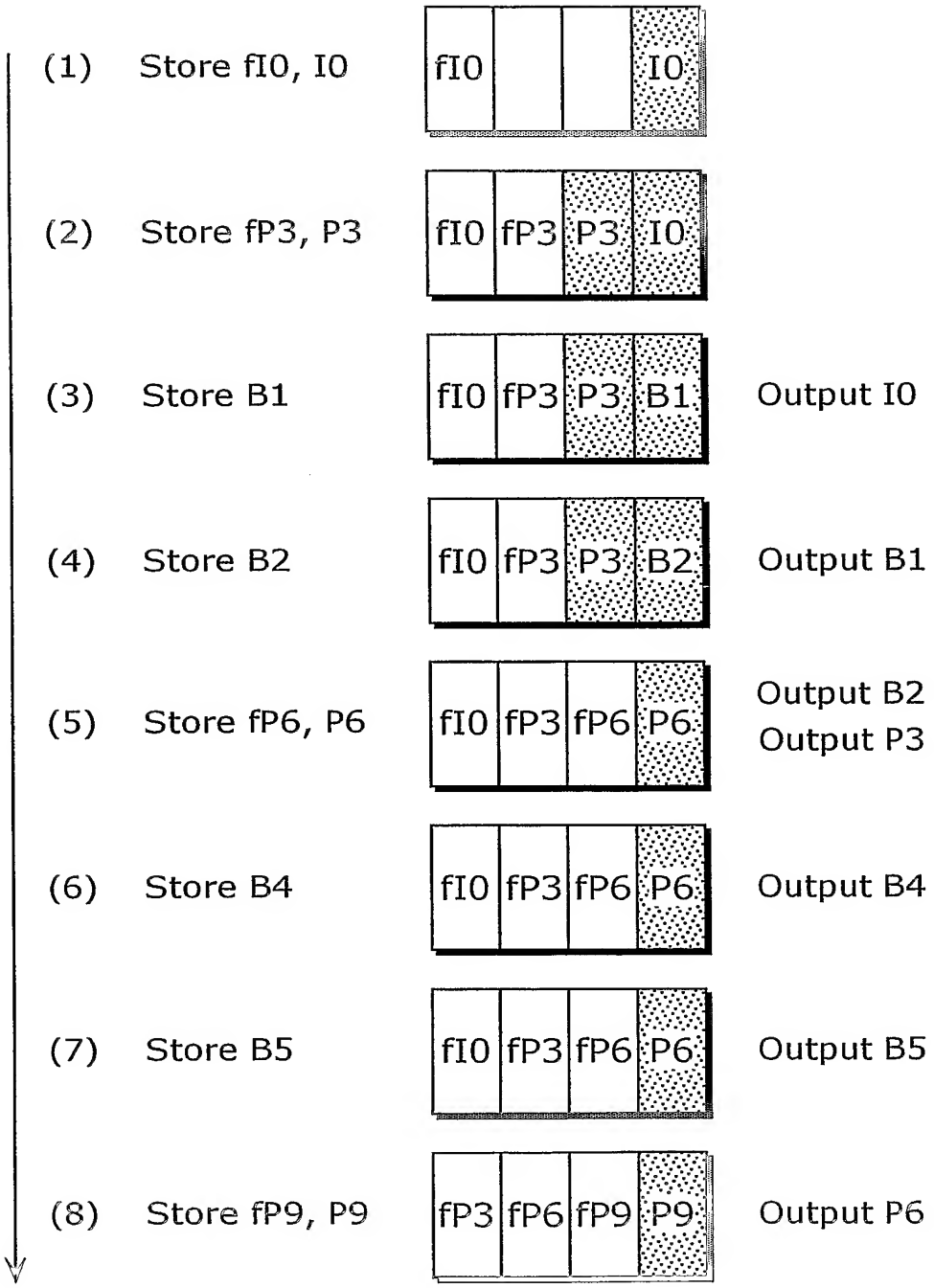

(1) Store fI0, I0
fI0
I0
(2) Store fP3, P3
fI0 fP3 P3 I0
(3) Store B1
fI0 fP3 P3 B1
Output I0
(4) Store B2
fI0 fP3 P3 B2
Output B1
(5) Store fP6, P6
fI0 fP3 fP6 P6
Output B2
Output P3
(6) Store B4
fI0 fP3 fP6 P6
Output B4
(7) Store B5
fI0 fP3 fP6 P6
Output B5
(8) Store fP9, P9
fP3 fP6 fP9 P9
Output P6

FIG. 3

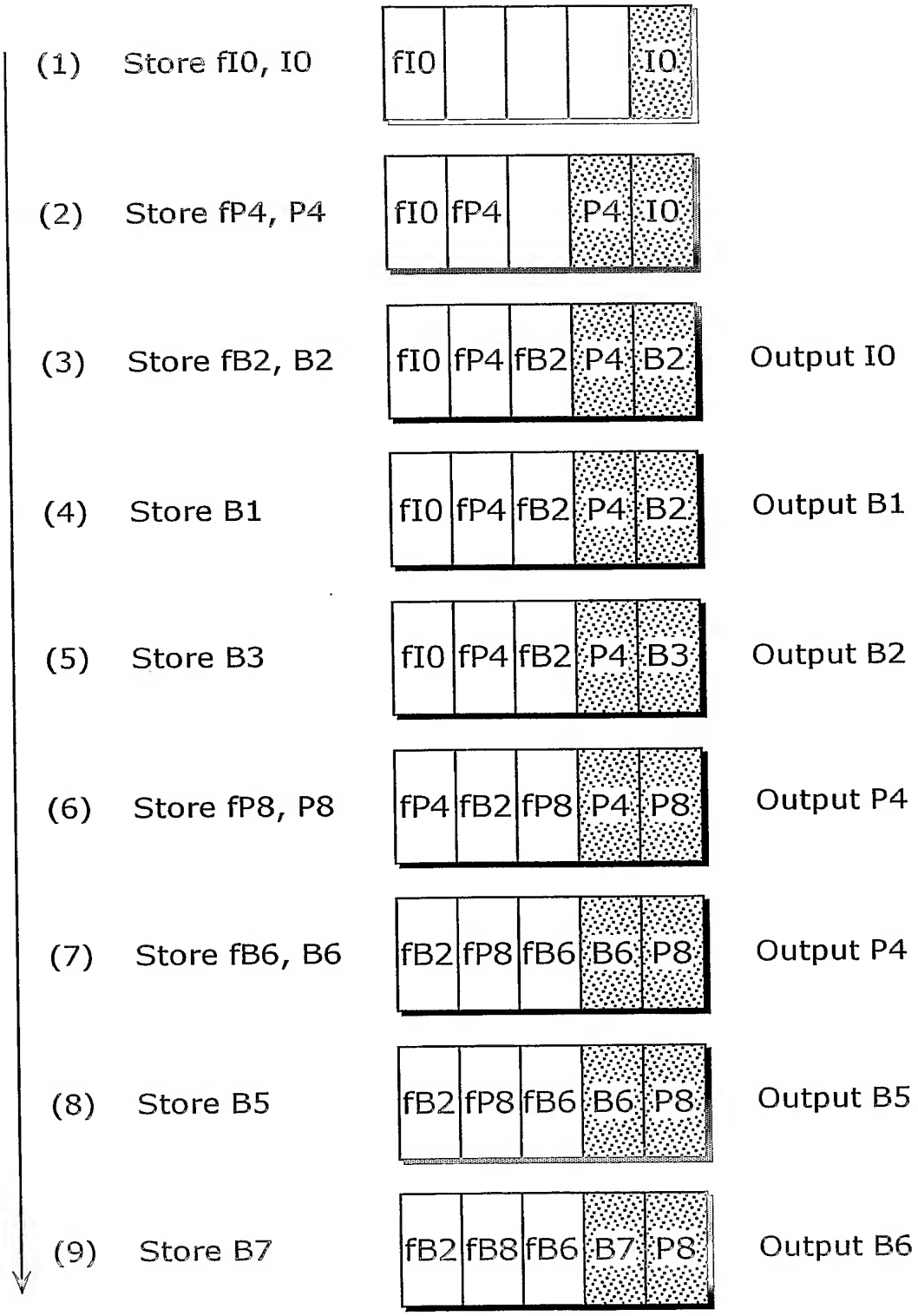

(1) Store fI0, I0
fI0
I0
(2) Store fP4, P4
fI0 fP4
P4 I0
(3) Store fB2, B2
fI0 fP4 fB2 P4 B2
Output I0
(4) Store B1
fI0 fP4 fB2 P4 B2
Output B1
(5) Store B3
fI0 fP4 fB2 P4 B3
Output B2
(6) Store fP8, P8
fP4 fB2 fP8 P4 P8
Output P4
(7) Store fB6, B6
fB2 fP8 fB6 B6 P8
Output P4
(8) Store B5
fB2 fP8 fB6 B6 P8
Output B5
(9) Store B7
fB2 fB8 fB6 B7 P8
Output B6

FIG. 4

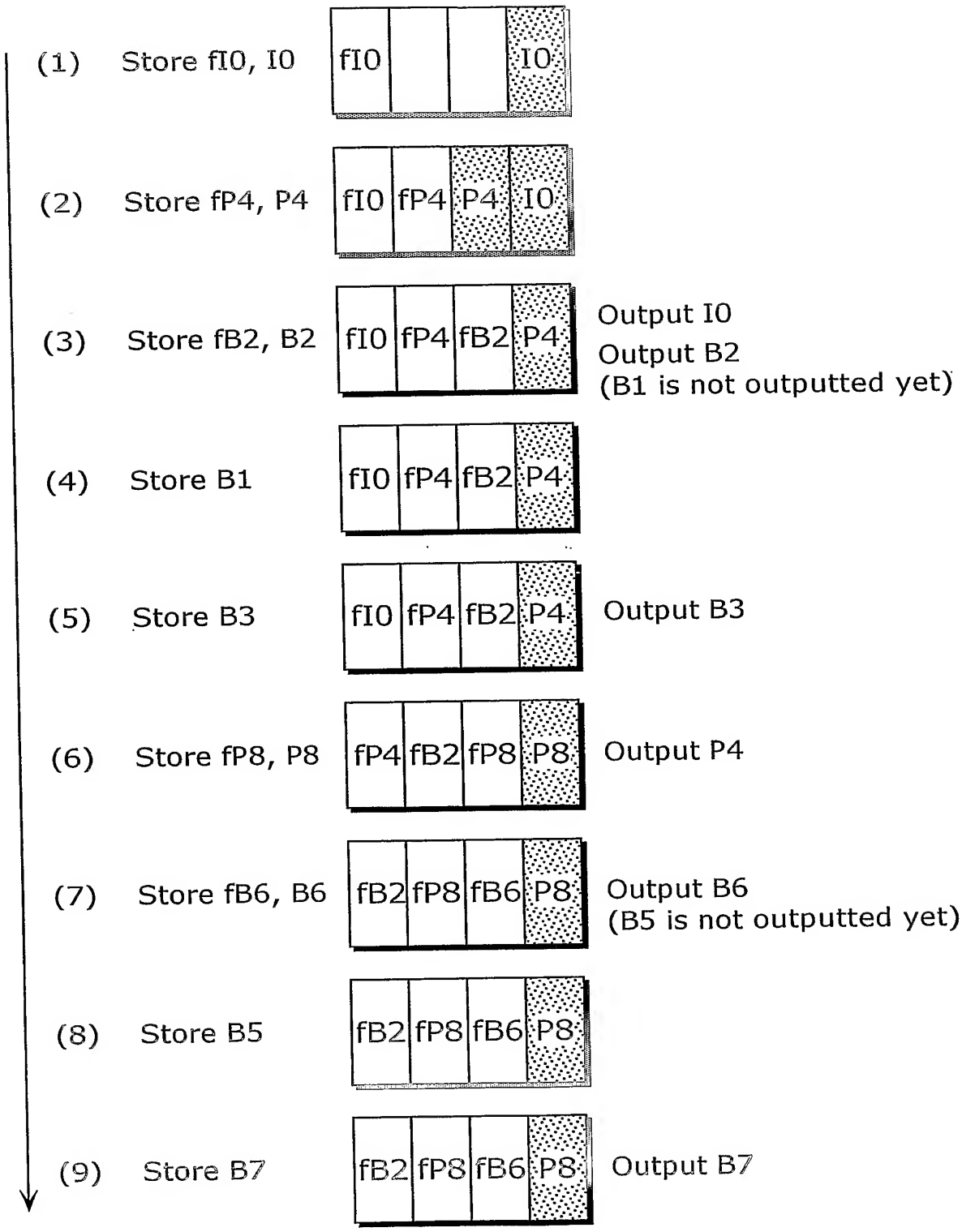

(1) Store fI0, I0
fI0
I0
(2) Store fP4, P4
fI0 fP4 P4 I0
(3) Store fB2, B2
fI0 fP4 fB2 P4
Output I0
Output B2
(B1 is not outputted yet)
(4) Store B1
fI0 fP4 fB2 P4
(5) Store B3
fI0 fP4 fB2 P4
Output B3
(6) Store fP8, P8
fP4 fB2 fP8 P8
Output P4
(7) Store fB6, B6
fB2 fP8 fB6 P8
Output B6
(B5 is not outputted yet)
(8) Store B5
fB2 fP8 fB6 P8
(9) Store B7
fB2 fP8 fB6 P8
Output B7

FIG. 5

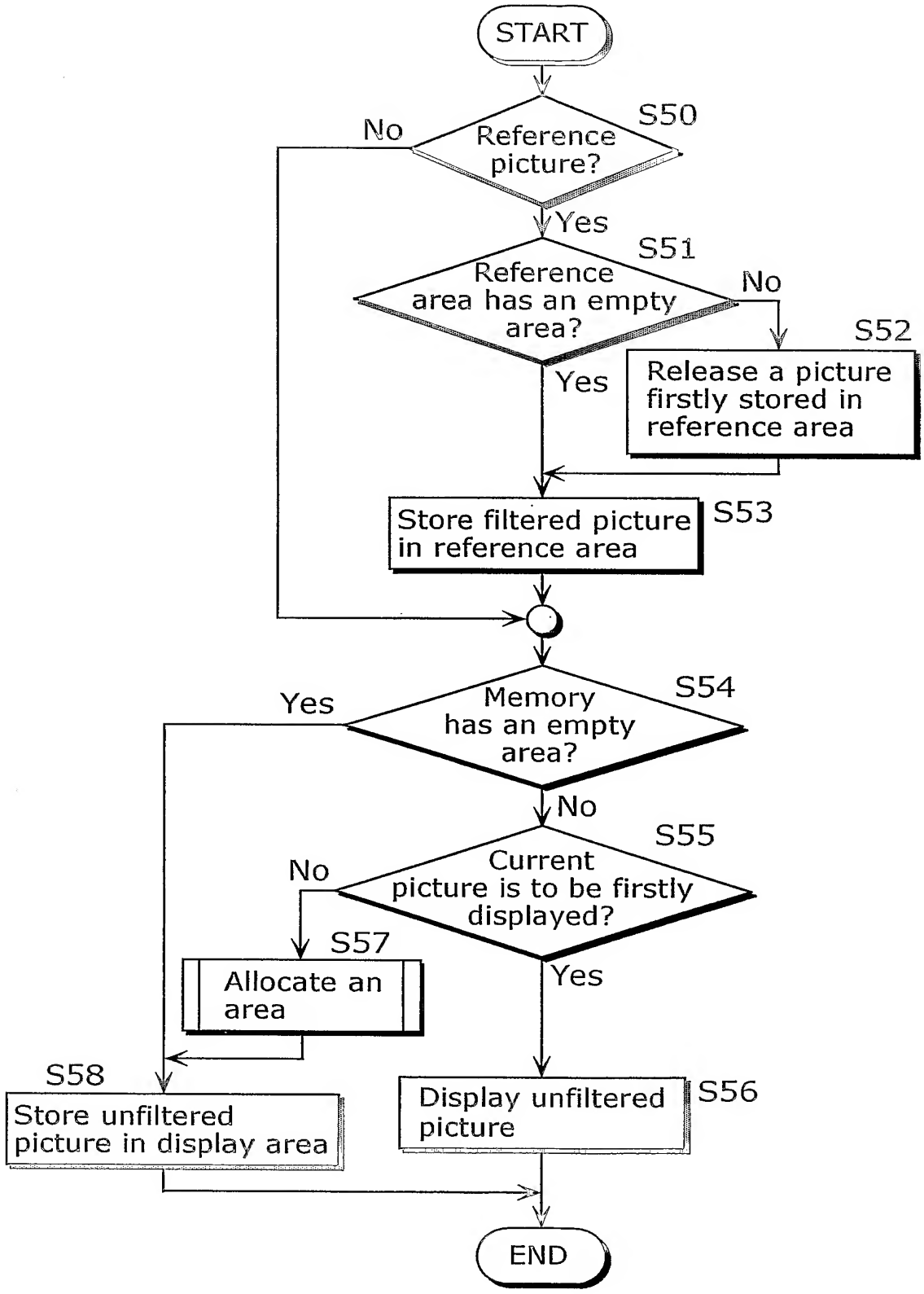

START
S50
Reference picture?
No
Yes
S51
Reference area has an empty area?
No
Yes
S52
Release a picture firstly stored in reference area
Store filtered picture in reference area
S53
S54
Memory has an empty area?
Yes
No
S55
Current picture is to be firstly displayed?
No
Yes
S57
Allocate an area
S58
Store unfiltered picture in display area
Display unfiltered picture
S56
END

FIG. 6

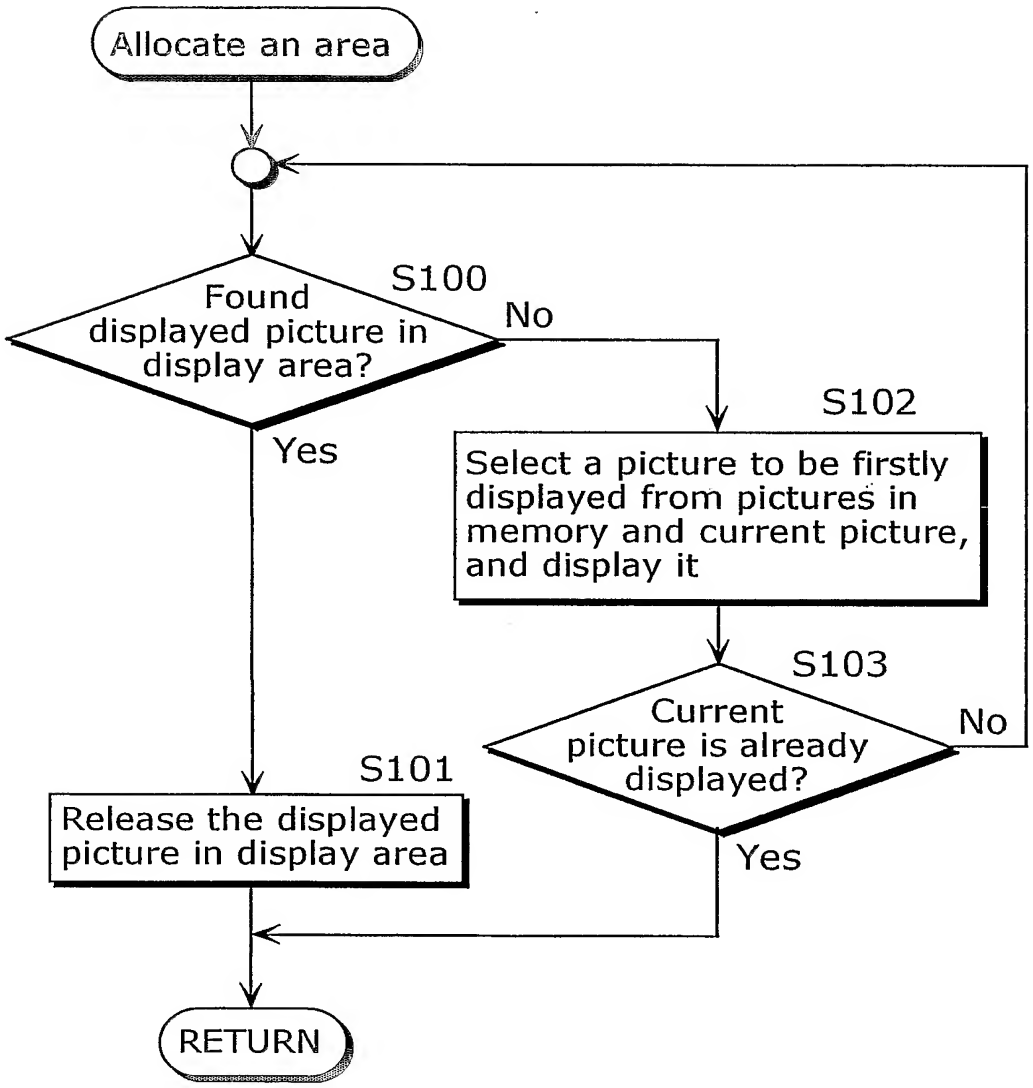

Allocate an area
Found displayed picture in display area?
S100
No
Yes
S102
Select a picture to be firstly displayed from pictures in memory and current picture, and display it
S103
Current picture is already displayed?
No
Yes
S101
Release the displayed picture in display area
RETURN

FIG. 7

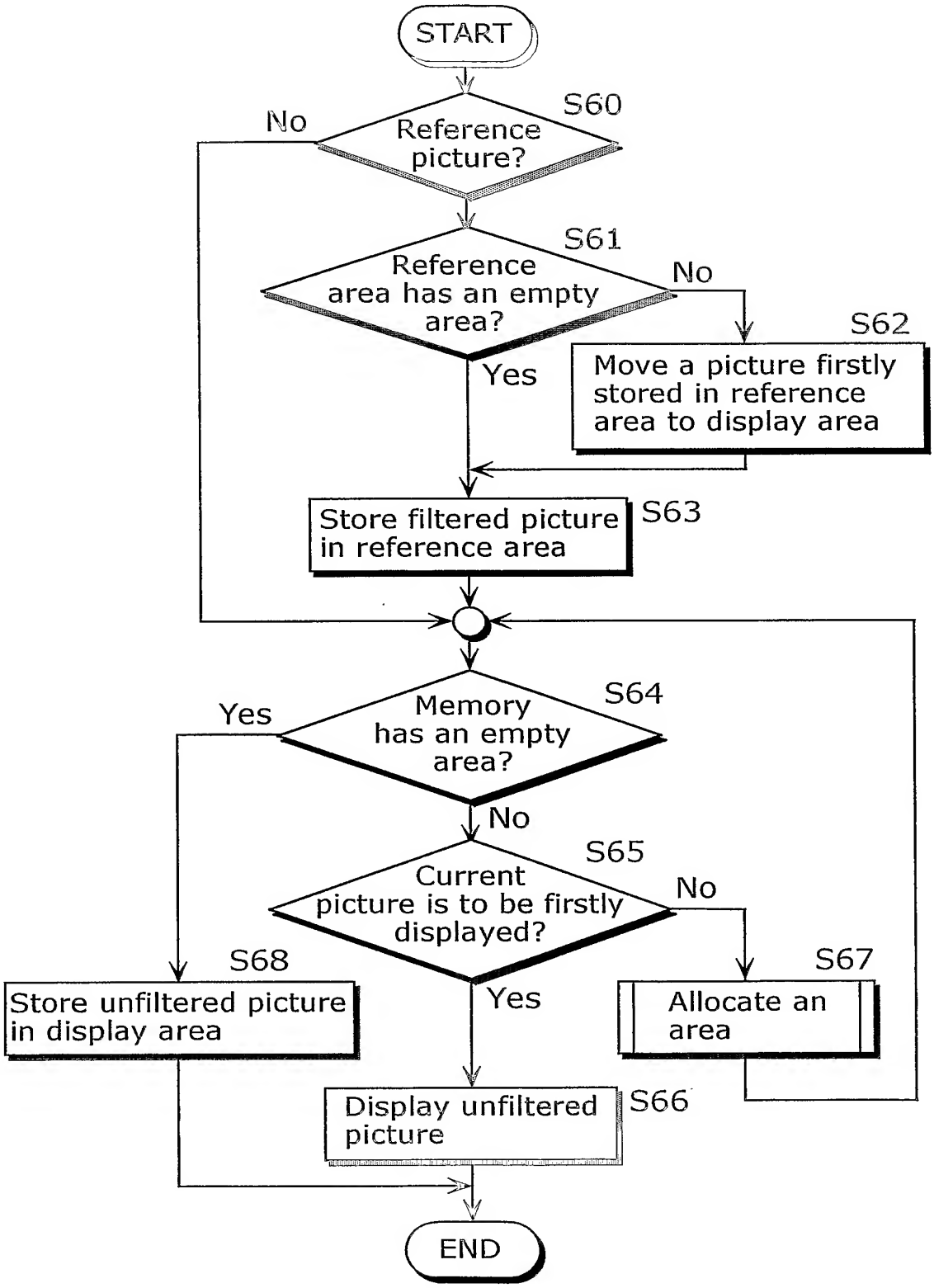

START
S60
Reference picture?
No
S61
Reference area has an empty area?
No
S62
Move a picture firstly stored in reference area to display area
Yes
Store filtered picture in reference area
S63
S64
Memory has an empty area?
Yes
No
S65
Current picture is to be firstly displayed?
No
S67
Allocate an area
S68
Store unfiltered picture in display area
Yes
Display unfiltered picture
S66
END

FIG. 8

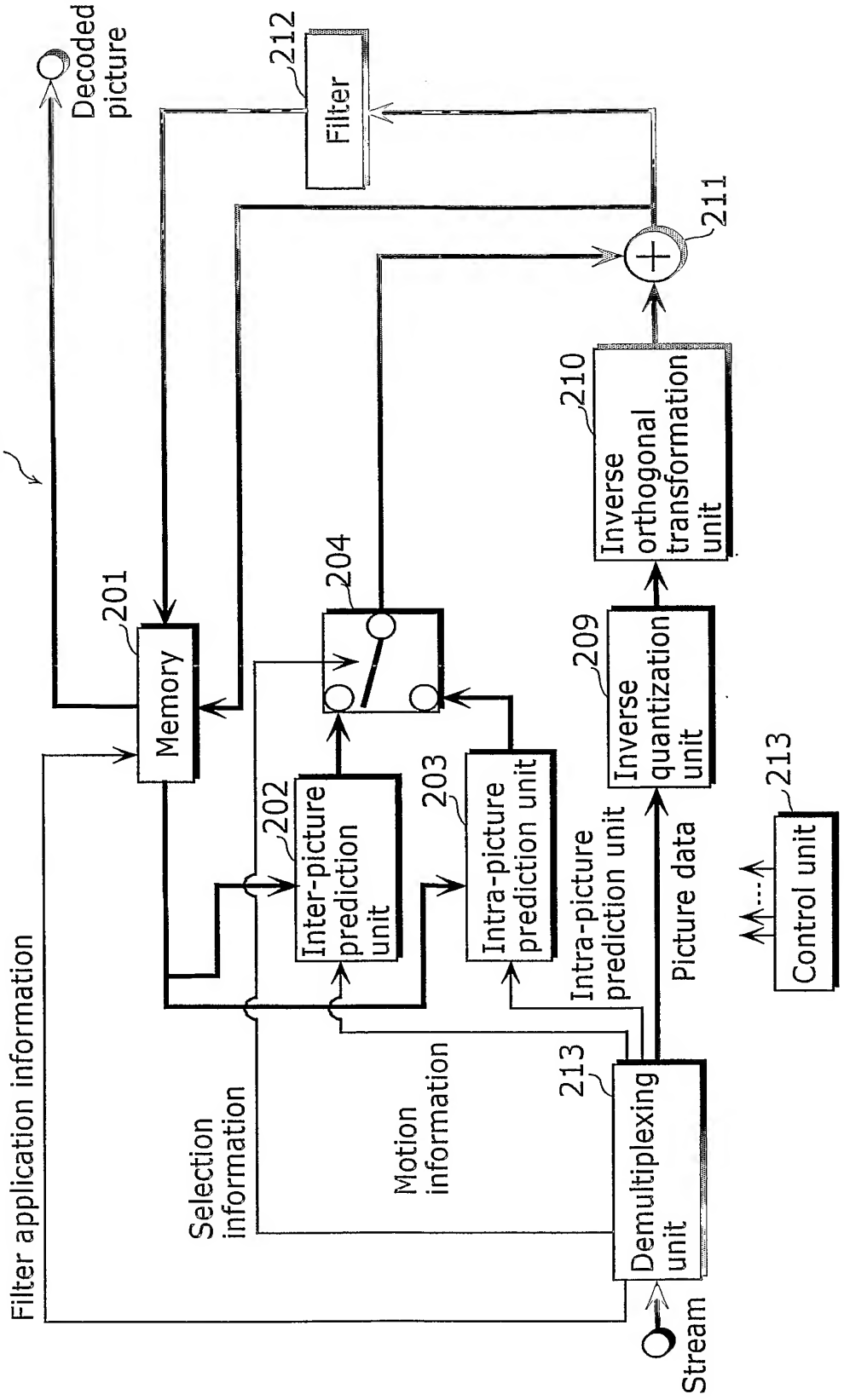

200
Decoded picture
212
Filter
211
210
Inverse orthogonal transformation unit
209
Inverse quantization unit
204
201
Memory
202
Inter-picture prediction unit
203
Intra-picture prediction unit
Intra-picture prediction unit
Picture data
213
Control unit
Filter application information
Selection information
Motion information
213
Demultiplexing unit
Stream

FIG. 9

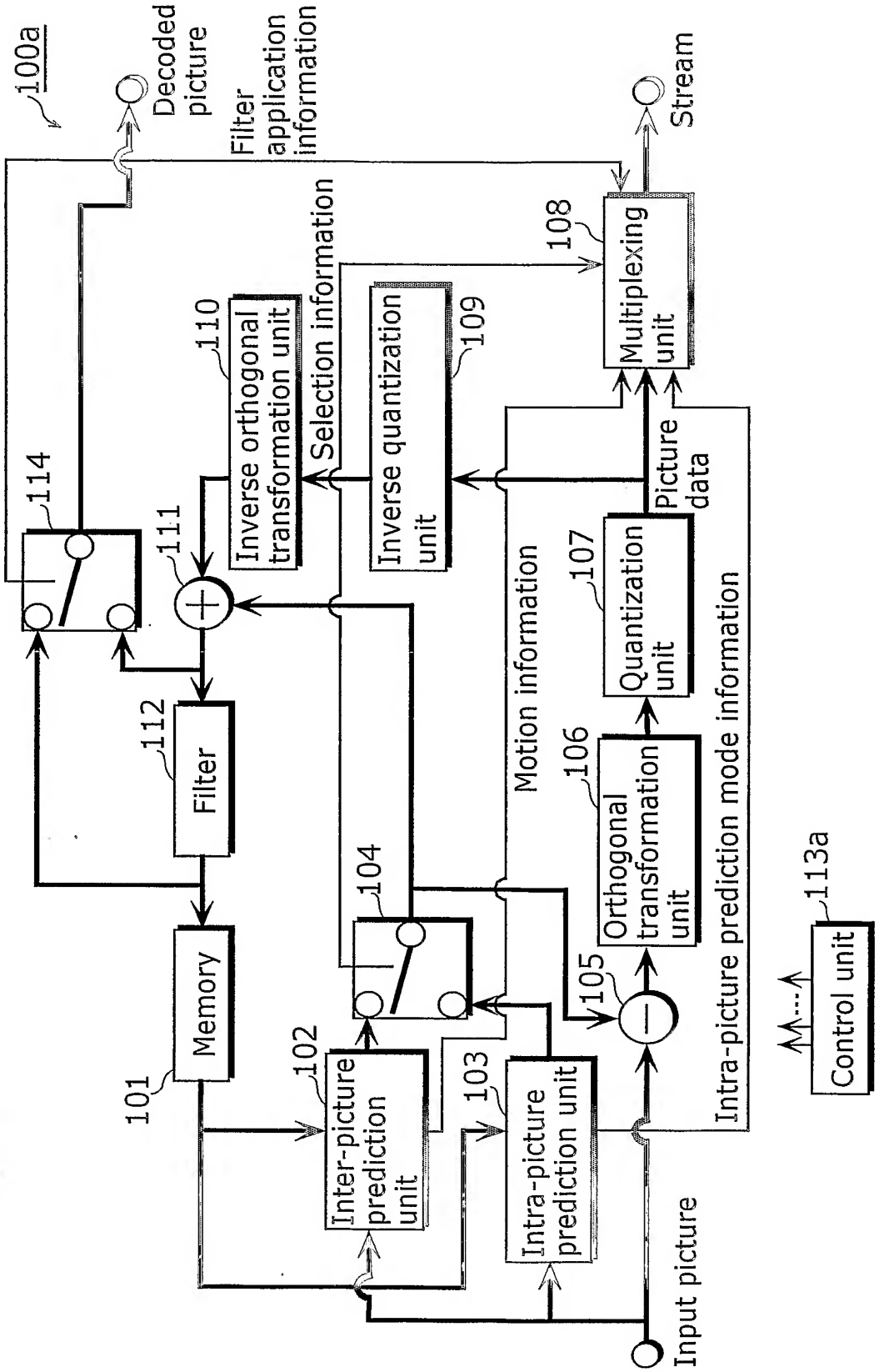

100a
Decoded picture
Filter application information
Stream
Selection information
108
Multiplexing unit
110
Inverse orthogonal transformation unit
Inverse quantization unit
109
114
111
Picture data
Motion information
107
Quantization unit
112
Filter
106
Orthogonal transformation unit
Intra-picture prediction mode information
104
Memory
105
113a
Control unit
101
102
Inter-picture prediction unit
103
Intra-picture prediction unit
Input picture

FIG. 10

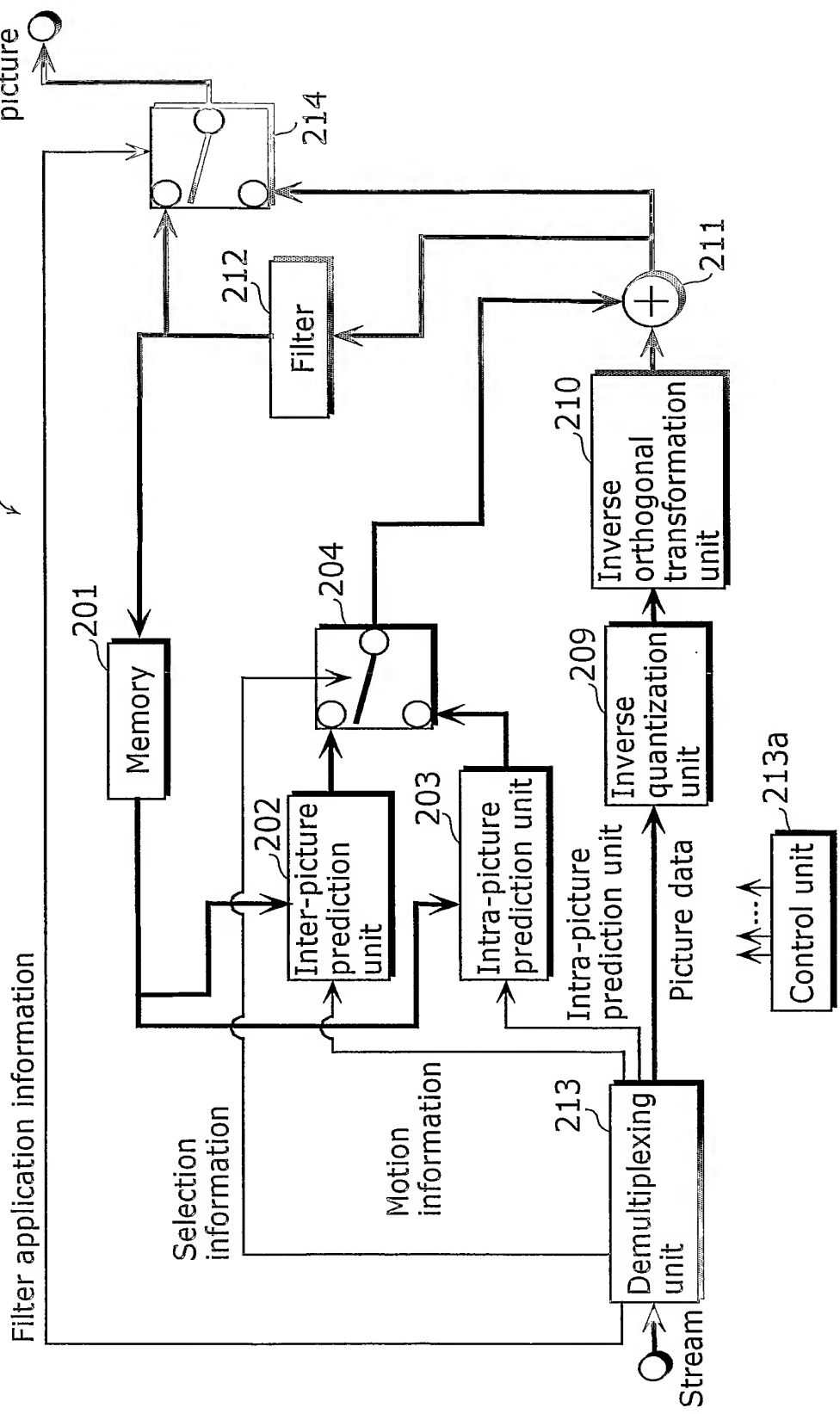

Decoded picture
214
212
Filter
211
200a
210
Inverse orthogonal transformation unit
201
Memory
204
209
Inverse quantization unit
202
Inter-picture prediction unit
203
Intra-picture prediction unit
Intra-picture prediction unit
Picture data
213a
Control unit
Selection information
Motion information
213
Demultiplexing unit
Filter application information
Stream

FIG. 11

Filter application information	
Number	Meaning
0	Output unfiltered pictures out of all the pictures in the stream
1	Output filtered pictures out of all the pictures in the stream
2	Output unfiltered picture of the picture specified by filter application information
3	Output filtered picture of the picture specified by filter application information
4	Output unfiltered pictures out of the pictures following the picture specified by filter application information
5	Output filtered pictures out of the pictures following the picture specified by filter application information

Fig. 12A

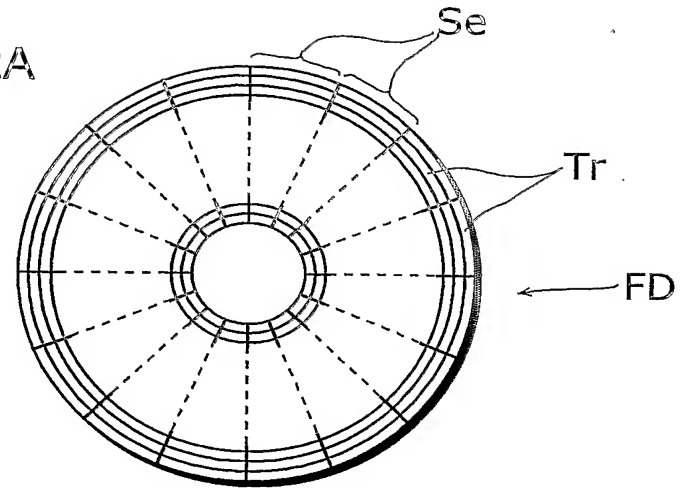


Fig. 12B

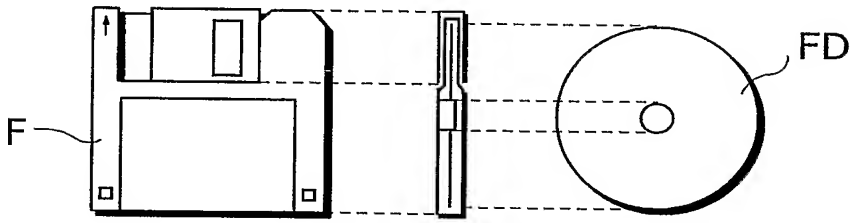
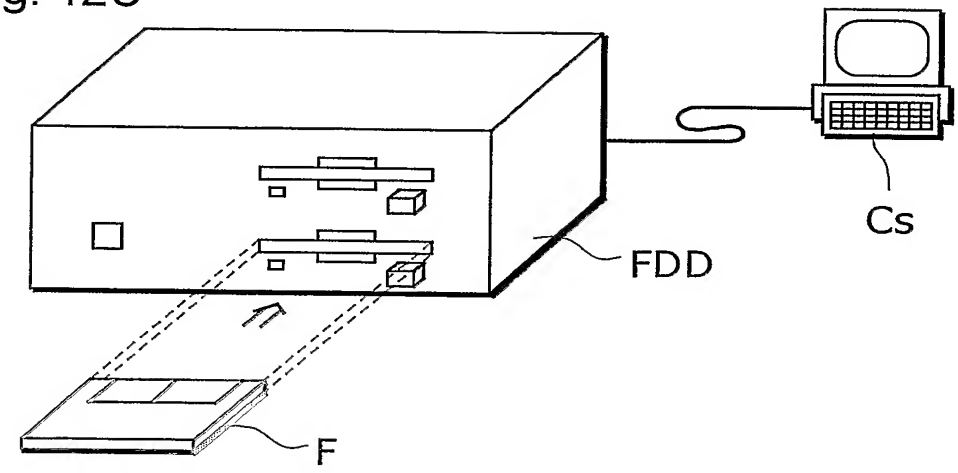


Fig. 12C



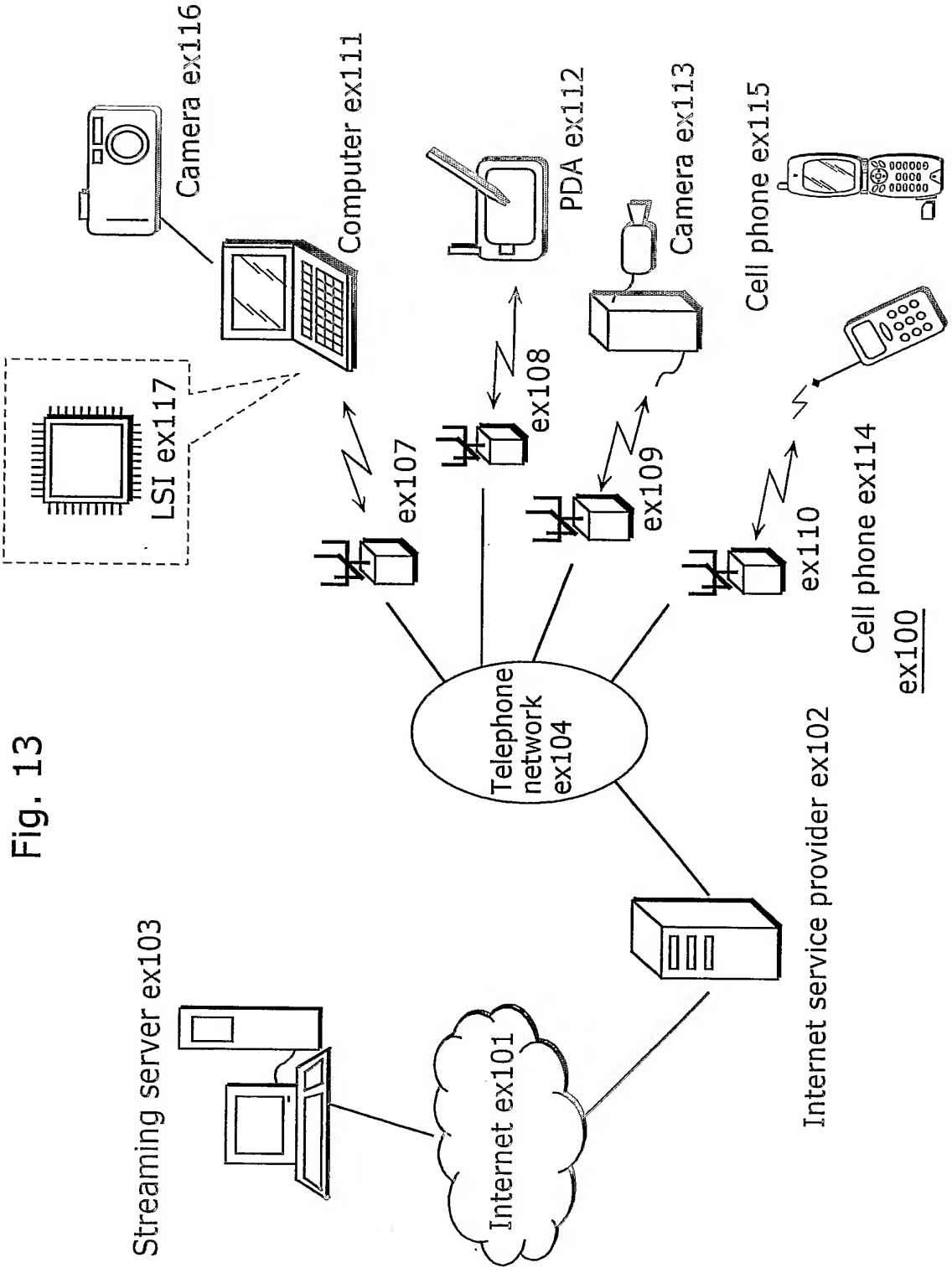

Camera ex116
Computer ex111
PDA ex112
Camera ex113
Cell phone ex115
LSI ex117
ex107
ex108
ex109
ex110
Cell phone ex114
ex100
Telephone network ex104
Internet service provider ex102
Streaming server ex103
Internet ex101

Fig. 13

Fig. 14

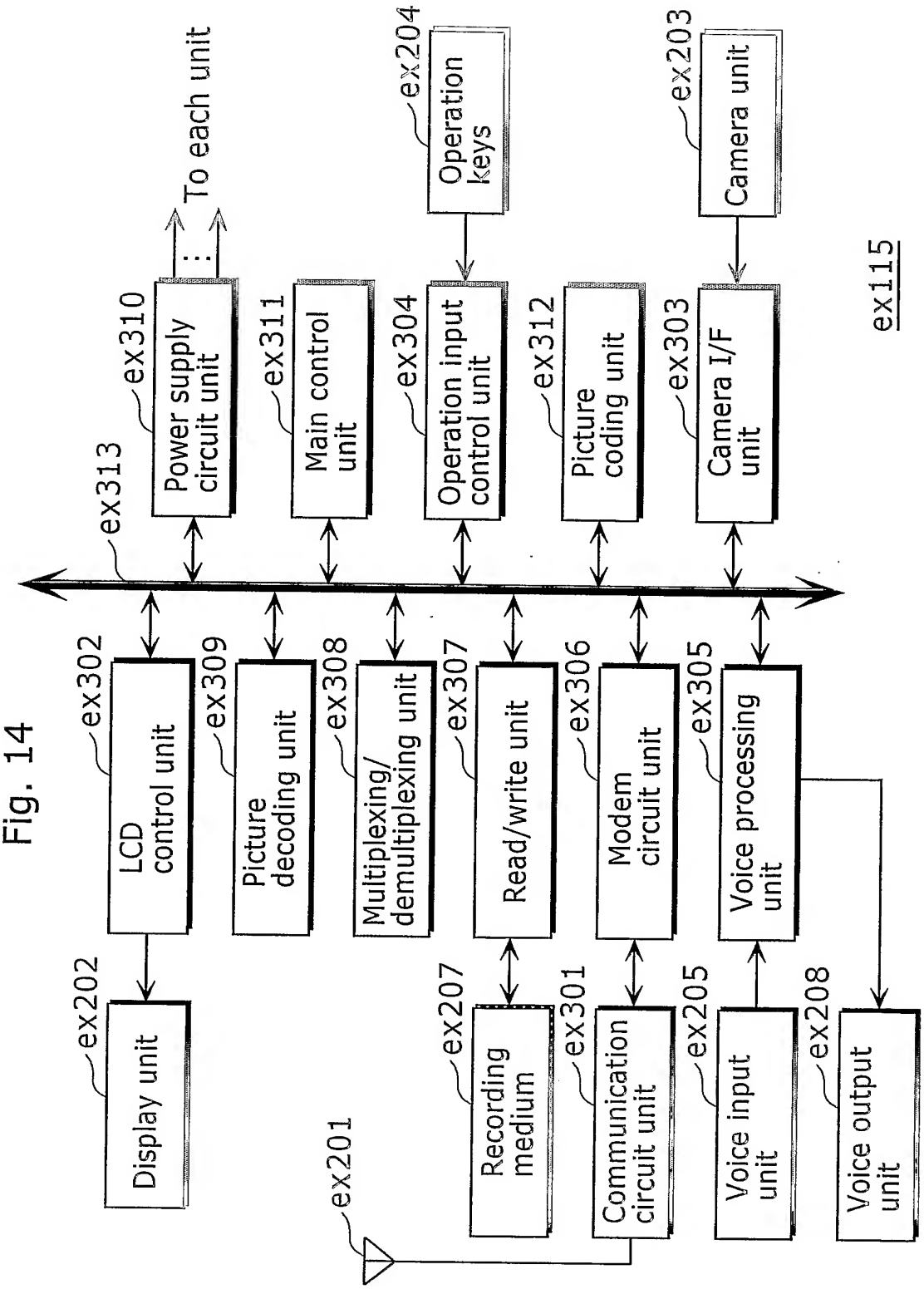

ex115
ex313
ex310
Power supply circuit unit
To each unit
ex311
Main control unit
ex304
Operation input control unit
ex204
Operation keys
ex312
Picture coding unit
ex303
Camera I/F unit
ex203
Camera unit
ex302
LCD control unit
ex309
Picture decoding unit
ex308
Multiplexing/ demultiplexing unit
ex307
Read/write unit
ex306
Modem circuit unit
ex305
Voice processing unit
ex202
Display unit
ex207
Recording medium
ex301
Communication circuit unit
ex205
Voice input unit
ex208
Voice output unit
ex201

Fig. 15

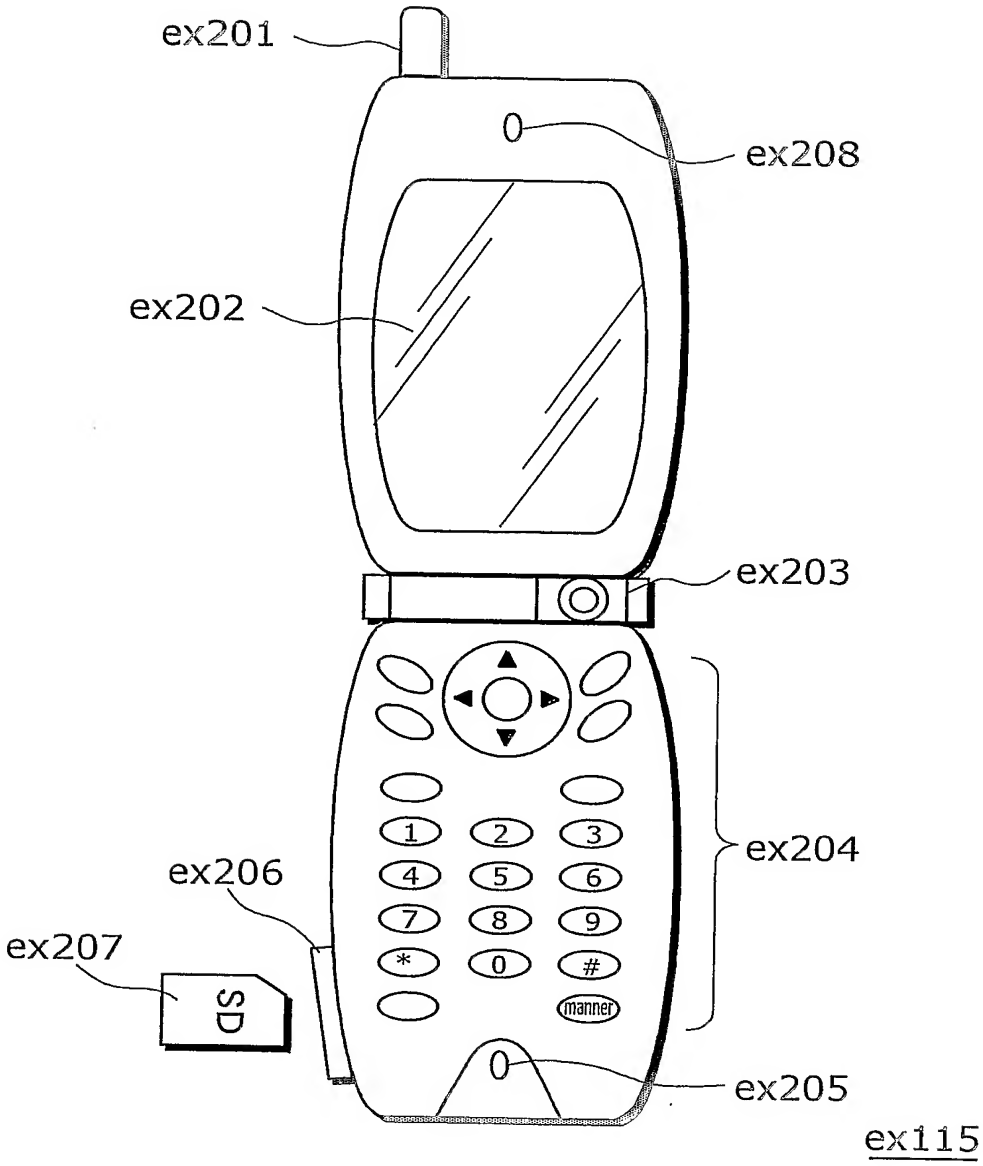

ex201
ex208
ex202
ex203
ex204
ex206
ex207
SD
ex205
ex115
manner

Fig. 16

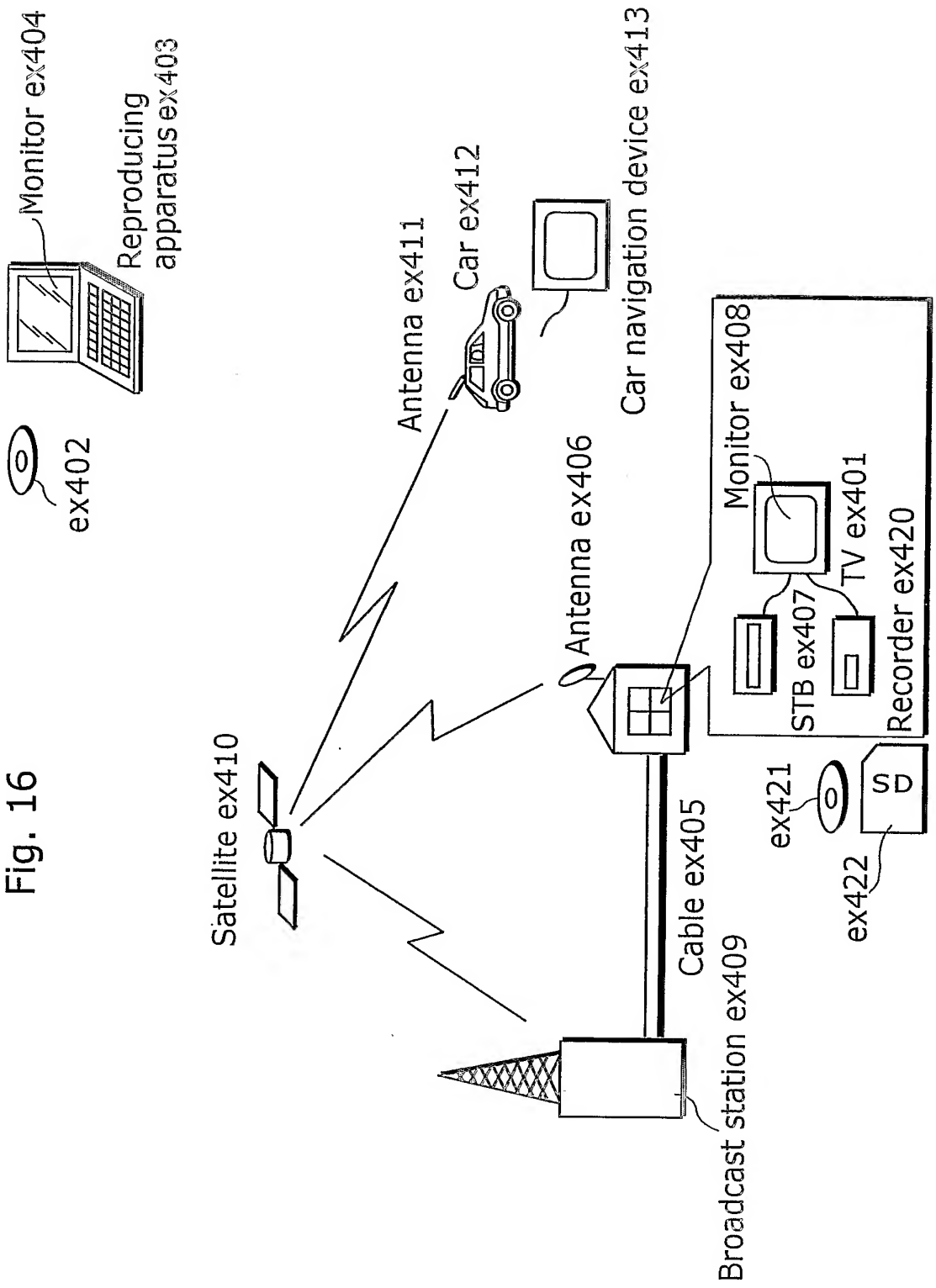

Monitor ex404
Reproducing apparatus ex403
ex402
Antenna ex411
Car ex412
Car navigation device ex413
Antenna ex406
Monitor ex408
TV ex401
STB ex407
Recorder ex420
Satellite ex410
Cable ex405
ex421
SD
ex422
Broadcast station ex409

FIG. 17

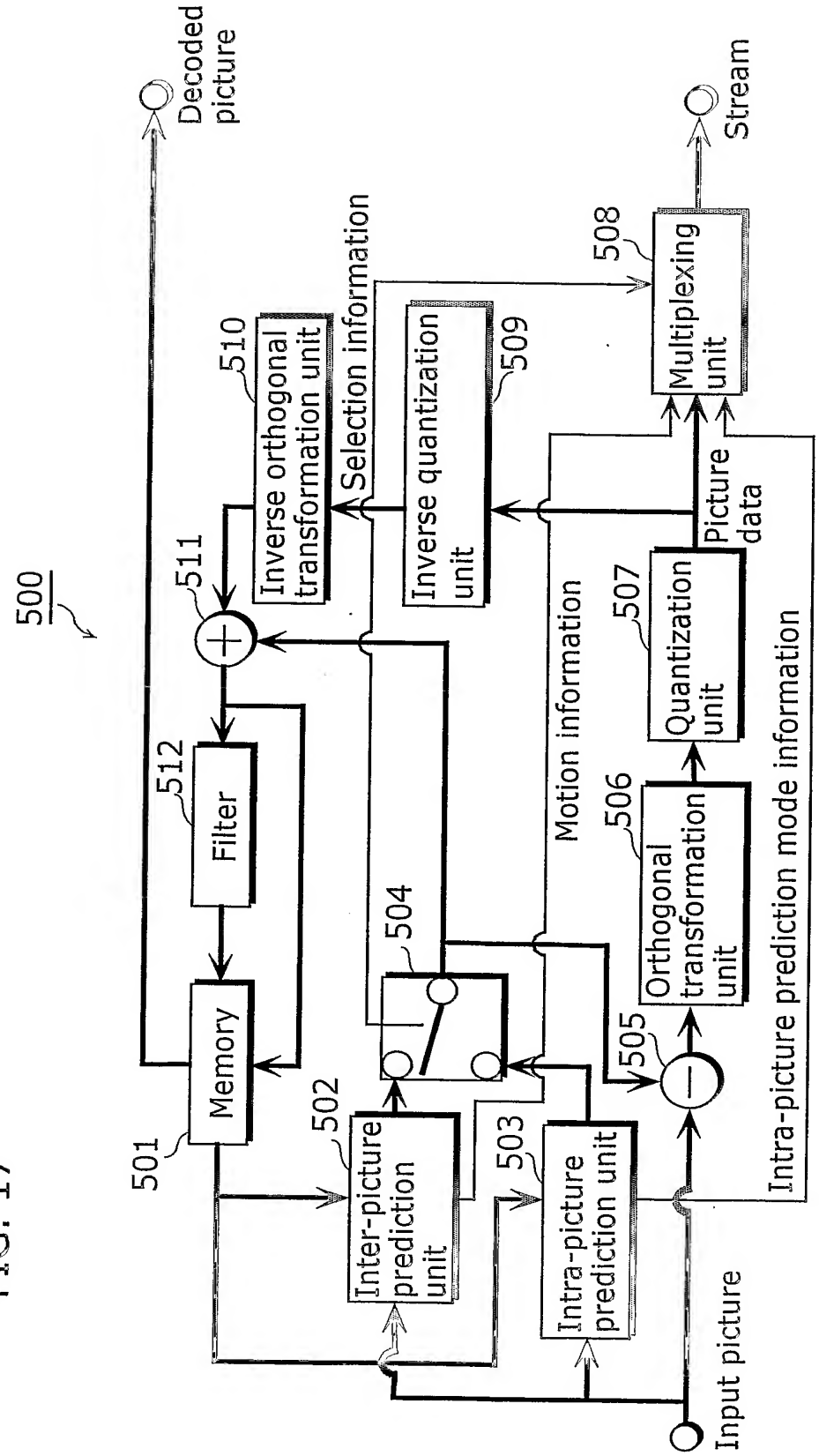
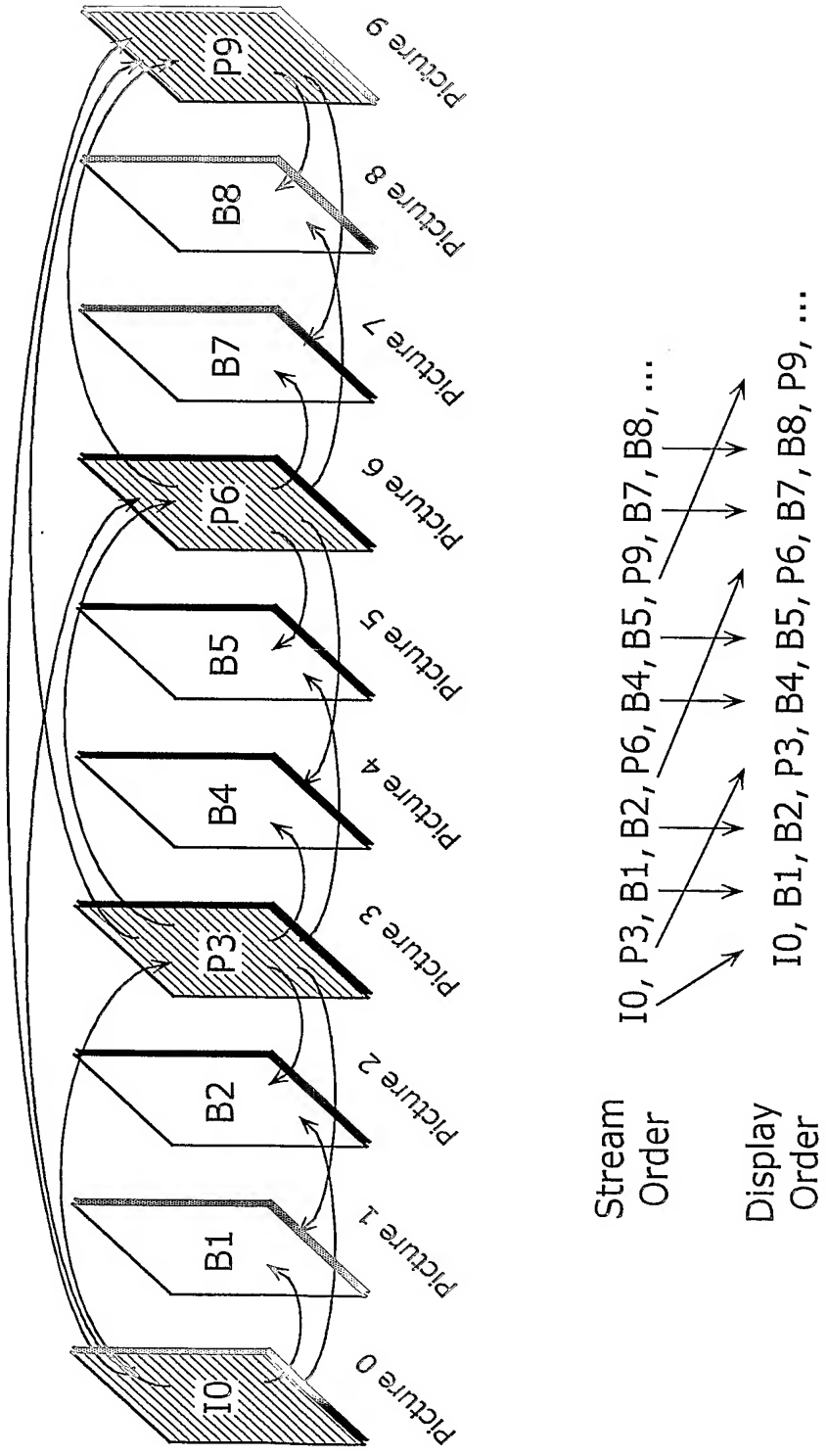

500
Decoded picture
Stream
Selection information
Motion information
Picture data
Intra-picture prediction mode information
Input picture
501 Memory
502 Inter-picture prediction unit
503 Intra-picture prediction unit
504
505
506 Orthogonal transformation unit
507 Quantization unit
508 Multiplexing unit
509 Inverse quantization unit
510 Inverse orthogonal transformation unit
511
512 Filter

FIG. 18


I0
B1
B2
P3
B4
B5
P6
B7
B8
P9
picture 0
picture 1
picture 2
picture 3
picture 4
picture 5
picture 6
picture 7
picture 8
picture 9
Stream Order
I0, P3, B1, B2, P6, B4, B5, P9, B7, B8, ...
Display Order
I0, B1, B2, P3, B4, B5, P6, B7, B8, P9, ...

【図19】

FIG. 19

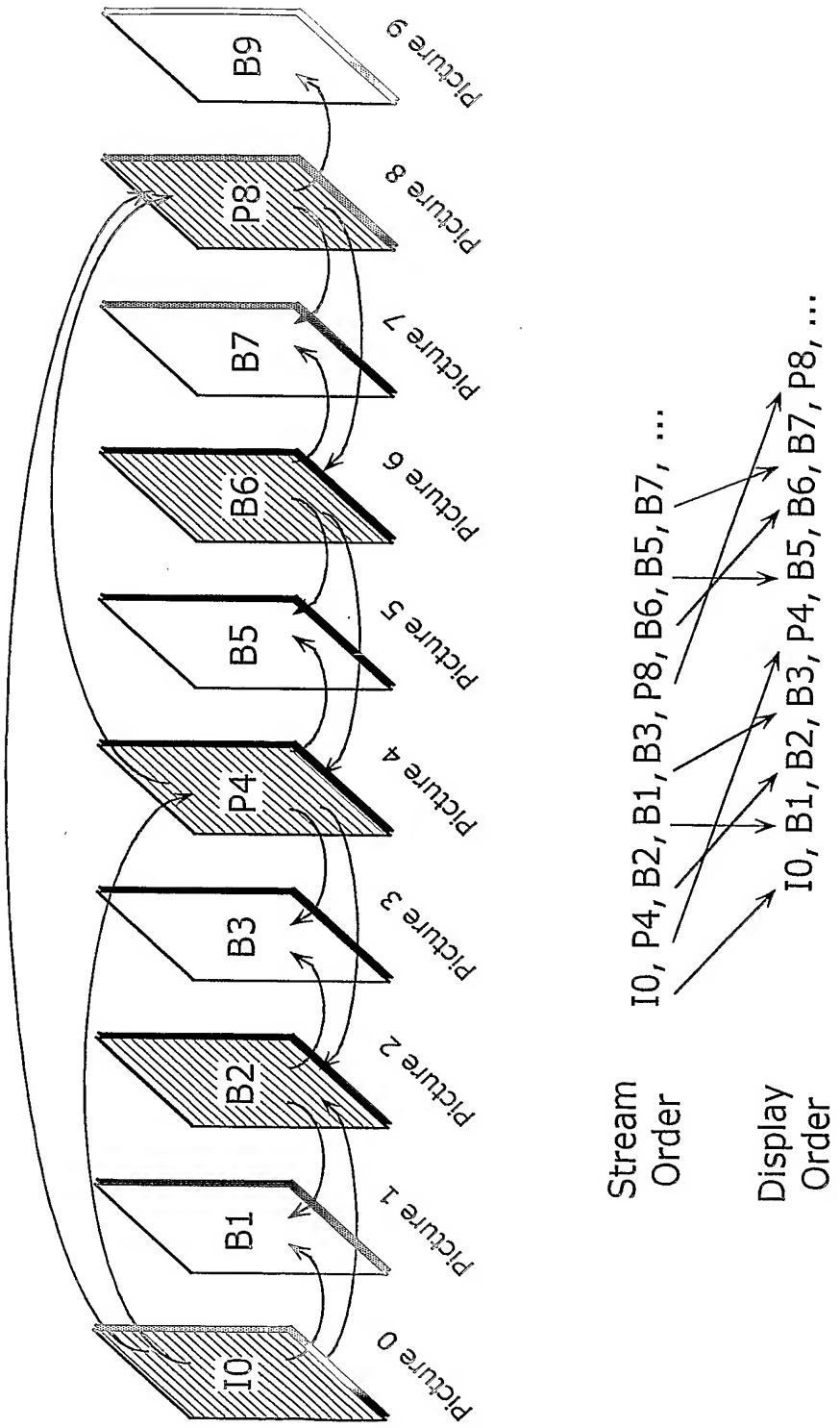

I0
B1
B2
B3
P4
B5
B6
B7
P8
B9
picture 0
picture 1
picture 2
picture 3
picture 4
picture 5
picture 6
picture 7
picture 8
picture 9
Stream Order
I0, P4, B2, B1, B3, P8, B6, B5, B7, ...
Display Order
I0, B1, B2, B3, P4, B5, B6, B7, P8, ...

FIG. 20

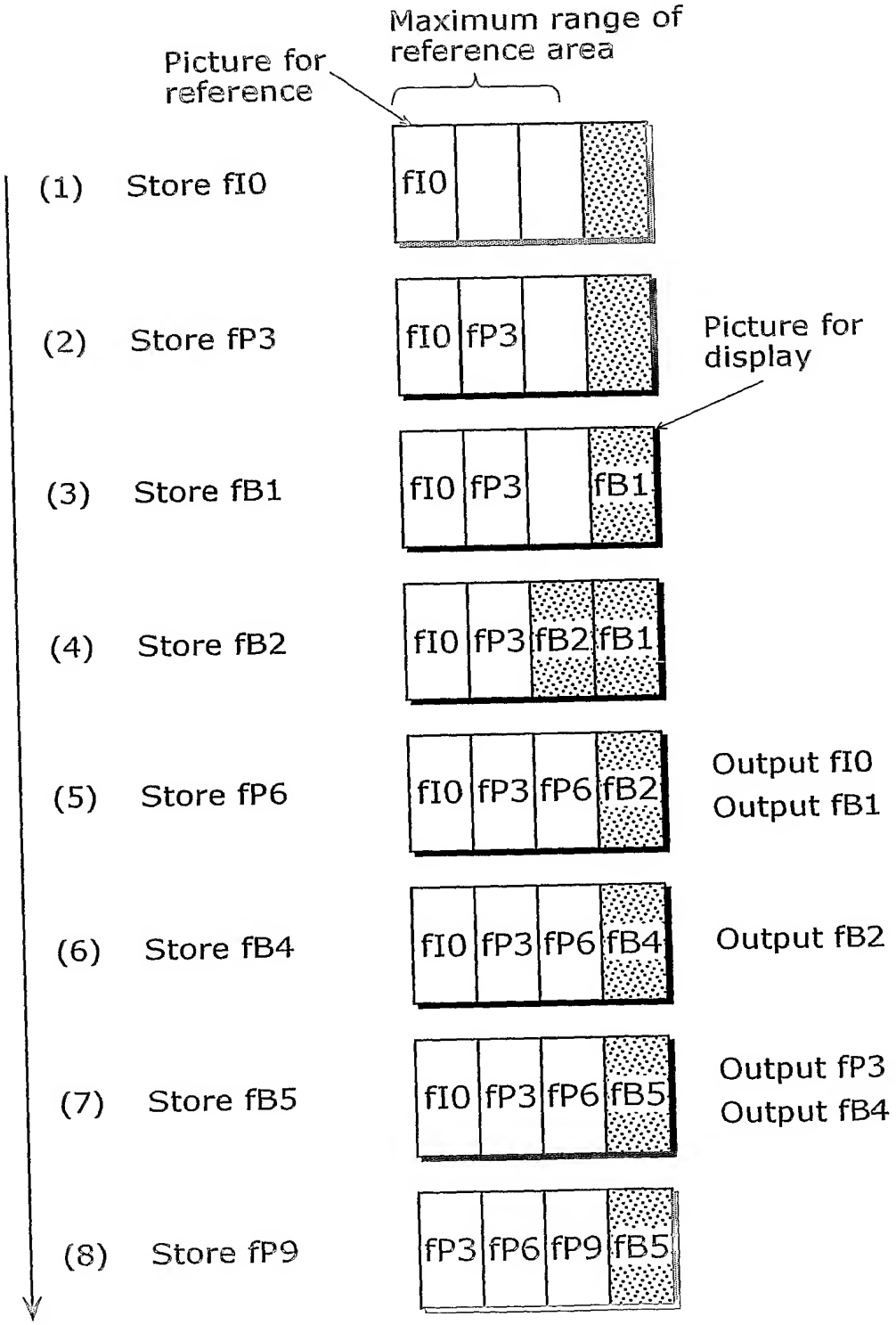
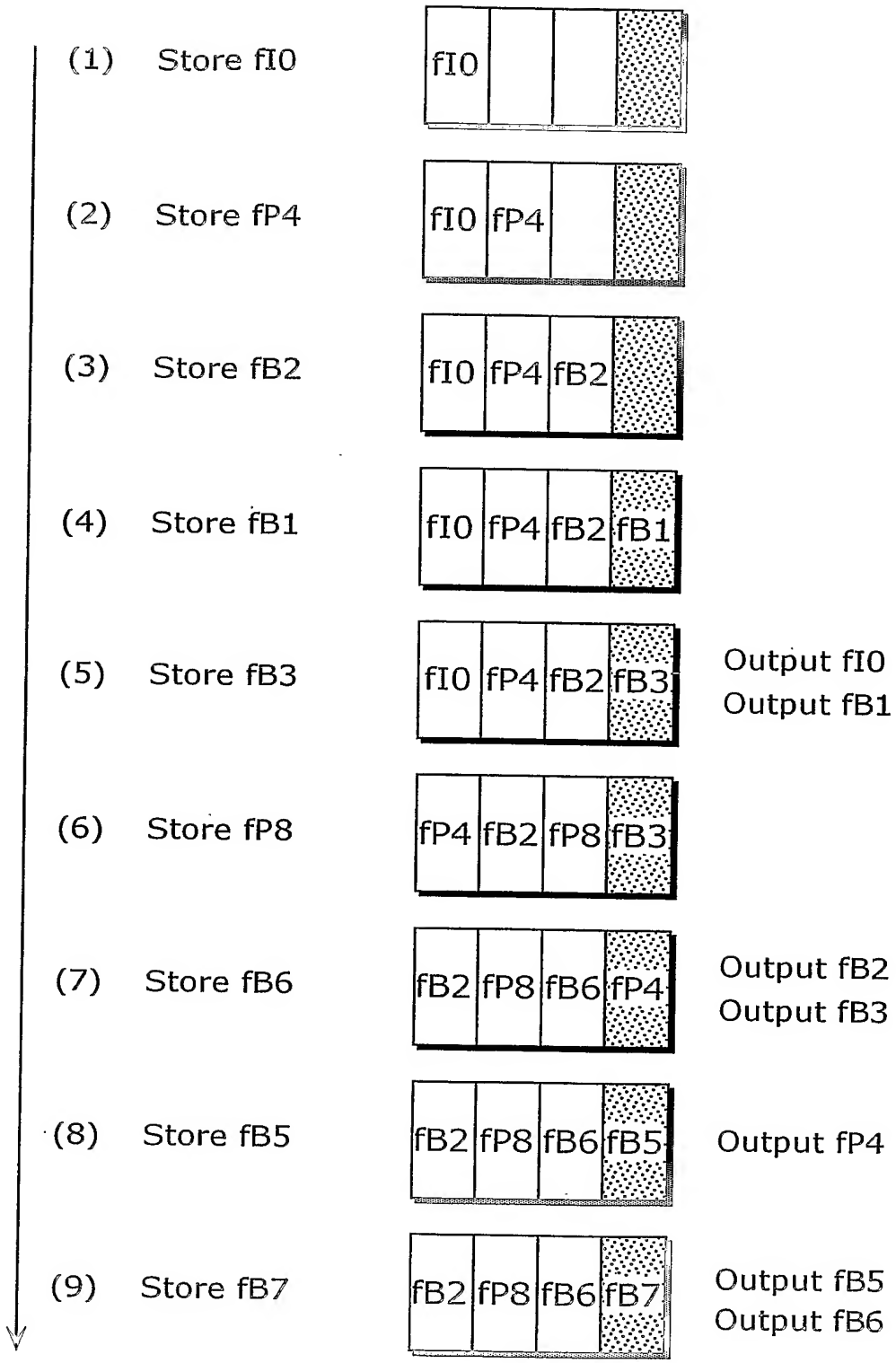

Maximum range of reference area
Picture for reference
(1) Store fI0
fI0
(2) Store fP3
fI0 fP3
Picture for display
(3) Store fB1
fI0 fP3 fB1
(4) Store fB2
fI0 fP3 fB2 fB1
(5) Store fP6
fI0 fP3 fP6 fB2
Output fI0
Output fB1
(6) Store fB4
fI0 fP3 fP6 fB4
Output fB2
(7) Store fB5
fI0 fP3 fP6 fB5
Output fP3
Output fB4
(8) Store fP9
fP3 fP6 fP9 fB5

FIG. 21


(1) Store fI0
fI0
(2) Store fP4
fI0 fP4
(3) Store fB2
fI0 fP4 fB2
(4) Store fB1
fI0 fP4 fB2 fB1
(5) Store fB3
fI0 fP4 fB2 fB3
Output fI0
Output fB1
(6) Store fP8
fP4 fB2 fP8 fB3
(7) Store fB6
fB2 fP8 fB6 fP4
Output fB2
Output fB3
(8) Store fB5
fB2 fP8 fB6 fB5
Output fP4
(9) Store fB7
fB2 fP8 fB6 fB7
Output fB5
Output fB6

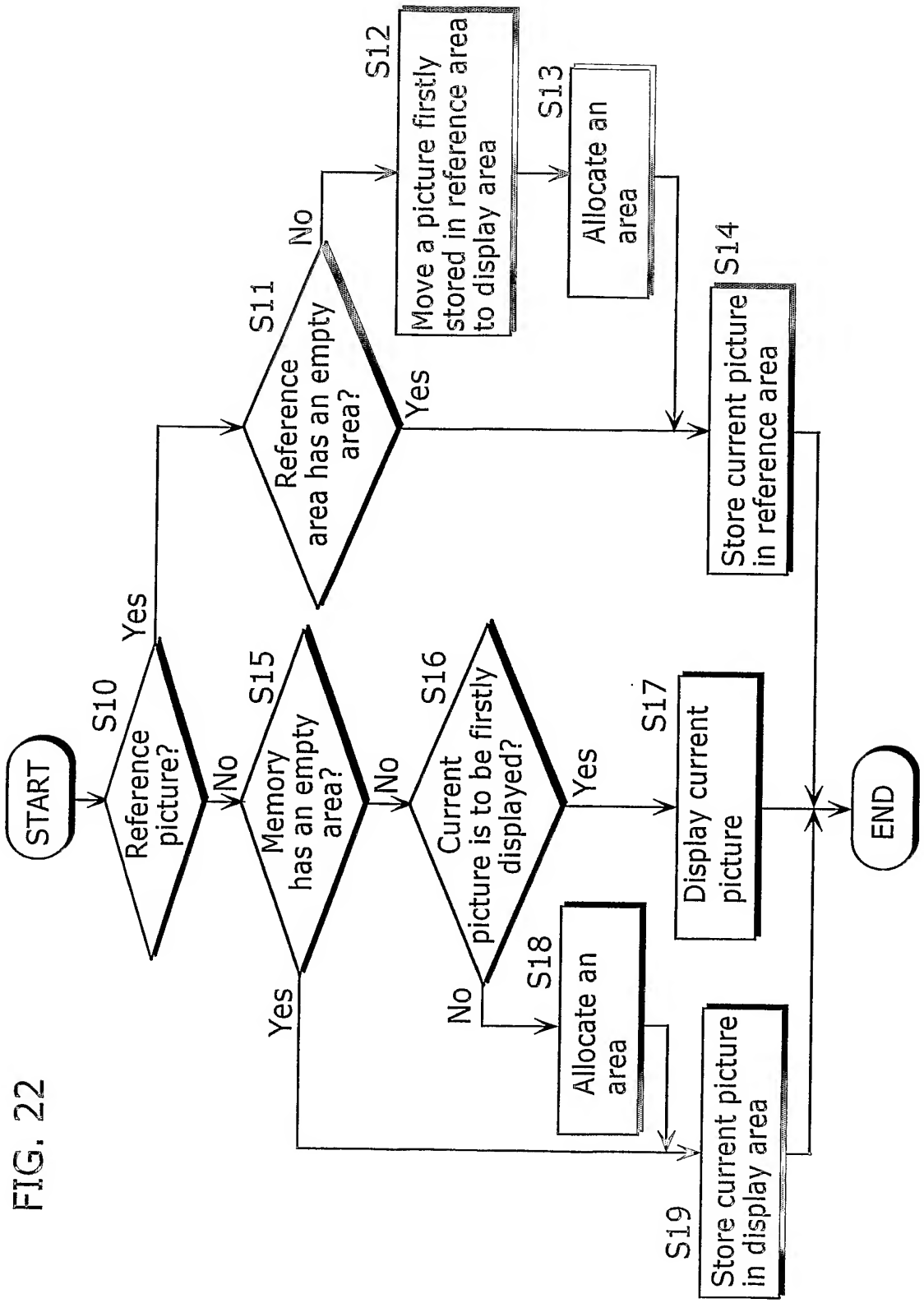

START
S10
Reference picture?
Yes
No
S11
Reference area has an empty area?
No
Yes
S12
Move a picture firstly stored in reference area to display area
S13
Allocate an area
S14
Store current picture in reference area
S15
Memory has an empty area?
Yes
No
S16
Current picture is to be firstly displayed?
Yes
No
S17
Display current picture
S18
Allocate an area
S19
Store current picture in display area
END

FIG. 22

FIG. 23

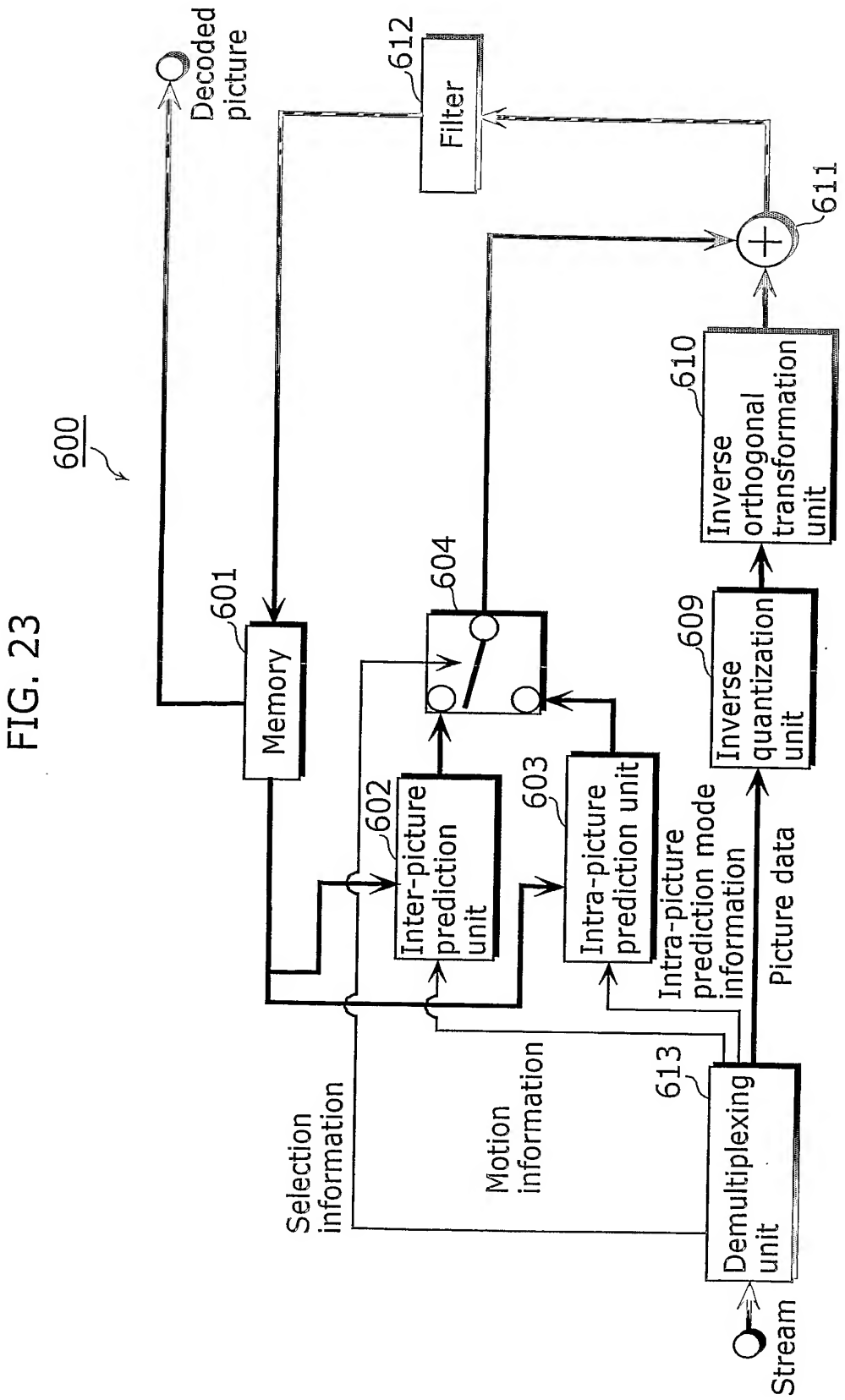

600
Decoded picture
612
Filter
611
610
Inverse orthogonal transformation unit
609
Inverse quantization unit
604
601
Memory
602
Inter-picture prediction unit
603
Intra-picture prediction unit
Intra-picture prediction mode information
Picture data
Selection information
Motion information
613
Demultiplexing unit
Stream

FIG. 24

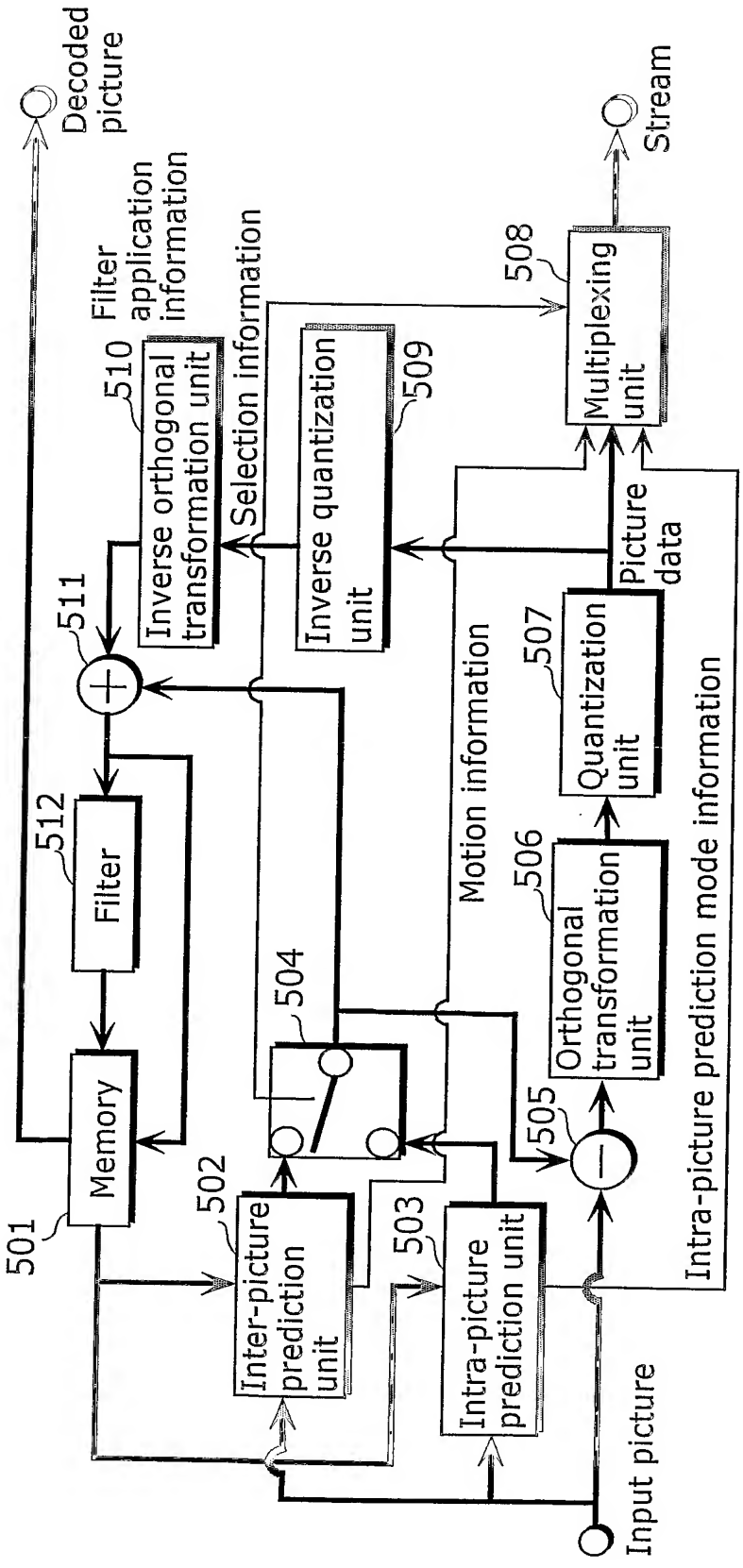
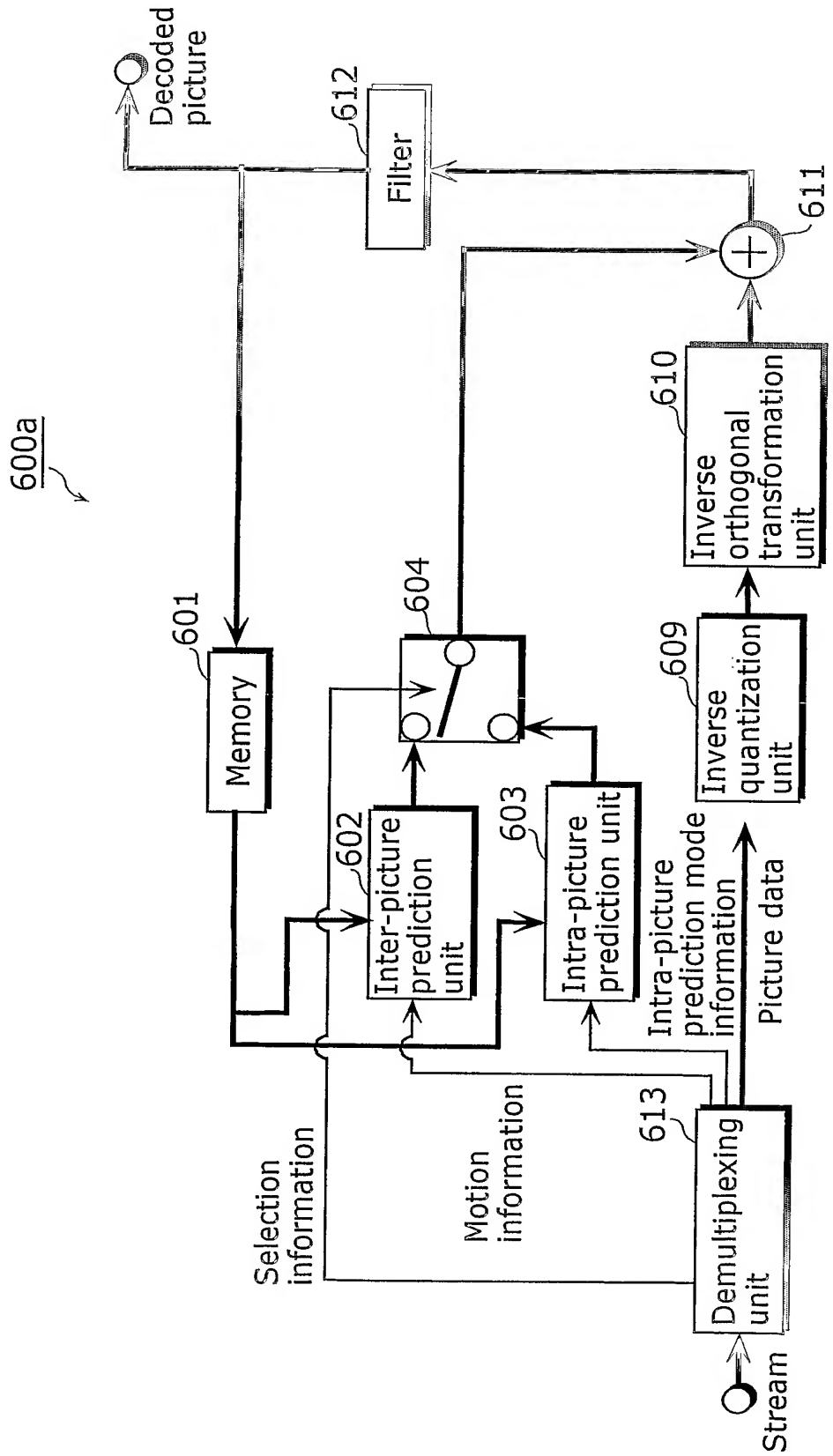

500a
Decoded picture
Filter application information
Selection information
Stream
Inverse orthogonal transformation unit
Inverse quantization unit
Multiplexing unit
Picture data
Motion information
Quantization unit
Filter
Orthogonal transformation unit
Memory
Inter-picture prediction unit
Intra-picture prediction unit
Intra-picture prediction mode information
Input picture
501
502
503
504
505
506
507
508
509
510
511
512

FIG. 25


600a
Decoded picture
612
Filter
611
610
Inverse orthogonal transformation unit
609
Inverse quantization unit
604
601
Memory
602
Inter-picture prediction unit
603
Intra-picture prediction unit
Intra-picture prediction mode information
Picture data
Selection information
Motion information
613
Demultiplexing unit
Stream